Claims:

1. Process for preparing methacrylic acid, characterized in that

a) acetone cyanohydrin is reacted at temperatures below 80°C with a maximum of 1.2 equivalents of sulphuric acid in the presence of 0.05-1.0 equivalent of water in the presence of a polar solvent inert under the reaction conditions to form an efficiently stirrable solution of the corresponding amide sulphates in the inert solvent,

b) after adding water, this solution, in the presence of or after preceding removal of the inert solvent, is converted to a solution consisting substantially of water, ammonium hydrogensulphate and alpha-hydroxyisobutyric acid,

c) hydroxyisobutyric acid is removed from the aqueous ammonium hydrogensulphate solution by extraction with a suitable extractant,

d) after removing the extractant, the alpha-hydroxyisobutyric acid obtained in high concentration, in the presence of a metal salt of the alpha-hydroxyisobutyric acid, is converted at temperatures between 160-300°C in the liquid phase to a mixture obtained as a distillate and consisting substantially of methacrylic acid and water, and

e) methacrylic acid is obtained distillatively in highly pure form from this mixture or the product mixture obtained under d) (MAA water) is used as an extractant for the isolation of the alpha-hydroxyisobutyric acid in step c) and

the materials of value are subsequently distillatively separated from one another.

2. Process according to Claim 1, characterized in that process step a) is performed at a temperature of less than 70°C.

3. Process according to Claim 1 or 2, characterized in that the solvent used is an inert C_2-C_{12} carboxylic acid, inert nitro compound or an aliphatic sulphonic acid.

4. Process according to Claim 3, characterized in that the inert C_2-C_{12} carboxylic acid is a carboxylic acid selected from the group of acetic acid, propionic acid, methylpropanoic acid, butyric acid, isobutyric acid and corresponding homologous longer-chain aliphatically branched and unbranched carboxylic acid.

5. Process according to Claim 4, characterized in that the inert C_2-C_{12} carboxylic acid is acetic acid.

6. Process according to Claim 3, characterized in that the inert nitro compound is nitromethane.

7. Process according to Claim 3, characterized in that the aliphatic sulphonic acid is methanesulphonic acid.

8. Process according to Claim 1, characterized in that, in step c), hydroxyisobutyric acid is separated from the aqueous ammonium hydrogensulphate solution by extraction with an extractant and this aqueous ammonium hydrogensulphate solution is converted in a sulphuric acid contact plant with formation of nitrogen to sulphuric acid which can be recycled into the amidation in step

a).

9. Process according to Claim 8, characterized in that the extractants used are nitro compounds, sulphonic acids and esters derived therefrom, carboxylic acids and esters derived therefrom, methyl hydroxyisobutyrate, and sparingly water-soluble ketones, ethers or aromatic solvents of the general formula R-C=O-R' (where R = Me- and R' = C-1 to C-12 hydrocarbons which may be branched or unbranched).

10. Process according to Claim 8 or 9, characterized in that the extractants used are methyl ethyl ketone or methyl isobutyl ketone.

11. Process according to one or more of the preceding claims, characterized in that step f) is performed as follows:

f) the mixture, obtained under step c), of methacrylic acid/water or pure methacrylic acid itself is reacted with an alcohol to obtain the ester desired as the product (= methacrylic ester) in a form desired for the application by known methods.

12. Process according to Claim 11, characterized in that the alcohol is methanol, ethanol, propanol and corresponding homologous and analogous compounds up to C_{12} hydrocarbons.

13. Process according to one or more of the preceding Claims 1 to 12, characterized in that full conversions of greater than (>)99% are achieved at a reaction time for the amidation of below 60 min, and at a reaction time for the hydrolysis of below 120 min.

14. Process according to one or more of the preceding Claims 1 to 12, characterized in that full conversions of greater than (>)99% are achieved at a reaction time for the amidation of below 30 min, and at a reaction time for the hydrolysis of below 100 min.

15. Process according to one or more of the preceding Claims 1 to 12, characterized in that full conversions of greater than (>)99% are achieved at a reaction time for the amidation of below 20 min, and at a reaction time for the hydrolysis of below 75 min.

16. Process according to one or more of the preceding Claims 1 to 12, characterized in that the yield of methacrylic acid is at least 95%.

17. Process according to one or more of the preceding Claims 1 to 12, characterized in that the yield of methacrylic acid is at least 98%.

18. Process according to one or more of the preceding Claims 1 to 12, characterized in that the yield of methacrylic acid is up to 99.5%.